

### **REMARKS**

The present response is intended to be fully responsive to all points of rejection raised by the Examiner and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

Claims 1-43 are pending in this case. Claims 2-7, 11-13 are objected to. Claims 14-26 and 27-39 have been rejected under 35 U.S.C. § 112, second paragraph. Claims 1-5, 7-8, 10-18, 20-21, 23-26, 40-43 have been rejected under 35 U.S.C. § 102(e). Claims 9 and 22 have been rejected under 35 U.S.C. § 103(a). Dependent claims 2-7, 11-13 have been amended.

With respect to the Examiner's 35 U.S.C. § 102(e) and 103(a) rejections, Applicant has reviewed the cited art and respectfully submits that the art fails to disclose or suggest the Applicant's claimed invention. Therefore, Applicant respectfully traverses and requests favorable reconsideration.

#### **Response to Claim Objections**

The Examiner objected to claims 2-7, 11-13 due to several informalities. Claims 2-7, 11-13 have been amended in accordance with the suggestions made by the Examiner. Applicants believe these amendments overcome the objections to the claims.

#### **Response to 35 U.S.C. § 112, Second Paragraph Rejections**

The Examiner rejected claims 14-26 and 27-39 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

In response, Applicant submits that the term 'virtual color' or 'logical color' as used in the specification is meant to denote a color that is assigned to a logical link that may or may not correspond to its actual color (i.e. wavelength). A virtual color is thus a color that is assigned to a logical link. It may not exist, meaning that there are no logical links that actually use that color (i.e. wavelength) to transmit data over the physical optical fibers. Colors are assigned to logical links in accordance with the protection path calculation mechanism of the present invention. For example, a logical link may have a certain wavelength (i.e. color) assigned to it in accordance with the management entity in the network. For protection path calculation purposes, however, the mechanism may assign the logical link a wavelength (i.e. color) other than the actual wavelength used to transmit data over the physical links.

The term "logical link" as defined in the specification is duplicated below:

"For networks that do not have sufficient redundancy within each color and for networks that do have sufficient redundancy within each color but use bundles of optical fiber to connect nodes, the mechanism of the present invention introduces the concept of virtual (i.e. logical) wavelength or color whereby the logical links in use over a particular physical link are assigned unique colors. By default, the color of the logical link is equal to its WDM wavelength. Note the virtual colors assigned may be the original real color or a 'virtual' color that does not actually exist. A characteristic of the network is that within each physical link there is only one instance of any particular color, either real or virtual." (emphasis added) Specification page 3, line 30 through page 4, line 4.

The term "logical link" is defined in the specification as well. The definition as described in the specification is duplicated below:

Logical link in a WDM or DWDM environment is defined as the electrically terminated link created between two nodes by assignment of a specific color. A logical link can span any number of physical links. In WDM or DWDM networks, different colors are used to establish logical links." Specification page 7, line 9 through page 8, line 2.

Thus, each logical link has an associated color (i.e. wavelength). Although a logical link can span any number of physical links, all the physical links within a logical link have the same color (i.e. wavelength).

It is therefore submitted that the terms 'virtual color' and 'logical link' are clear since the specification describes these terms as they are used in the claims. The Examiner is respectfully requested to withdraw the § 112, second paragraph rejection.

#### **Response to 35 U.S.C. § 102(e) Rejections**

The Examiner rejected claims 1-5, 7-8, 10-18, 20-21, 23-26, 40-43 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,324,162 ("Chaudhuri). Applicant respectfully submits that the prior art fails to disclose or suggest at least a method of determining a protection route comprising the steps of removing (1) all logical links from consideration that have a color other than that of the link to be protected and (2) the link to be protected and generating a restoration path only from the remaining single color logical topology. Therefore, Applicant respectfully traverses the rejections and request favorable reconsideration.

The Examiner asserts that Chaudhuri teaches removing from consideration all logical links having a color other than that of the link to be protected to generate a single color logical topology. See col. 4, lines 53-67, col. 5 lines 19-29, col. 7, lines 62-67 and col. 8, line 32-39.

Applicant respectfully disagrees with this assertion as nowhere does Chaudhuri teach or suggest the protection path calculation mechanism of the present invention. In particular, col. 4, lines 53-67 teaches the RPCS restoration computation algorithm is based on the shortest path. The RPCS considers a channel in the link and determines the path in which the channel belongs. The RPCS then computes the shortest path between the terminating nodes from the restoration channel set  $R_i$ . The restoration channel set  $R_i$  is determined by creating a temporary list of all available restoration channels in the network. For each link, the RPCS establishes a working  $P_i$  path for each of the working path channels in a link that requires restoration. The RPCS creates a set of  $R_i$  channels consisting of all available restoration channels in the entire network, except the ones in link  $14_i$ , and all the channels in path  $P_i$ , except the ones in link  $14_i$ .

Unlike the present invention, the algorithm Chaudhuri, however, does not utilize color (or wavelength) in computing restoration paths. Nor does Chaudhuri perform the restoration route calculation using logical links since the algorithm of Chaudhuri is based on channels within physical links. Note that the term links as used by Chaudhuri refers to physical connections between two nodes. A plurality of channels over a series of links are used to construct paths. Thus, Chaudhuri uses the term 'link' to denote physical links between nodes.

In contrast, the term 'logical link' as used in the present invention denotes an eclectically terminated link created between two nodes which can span any number of physical links. Thus, the terms logical link as used in the present invention and the term link as used by Chaudhuri are not equivalent and should be distinguished.

Col. 5, lines 19-29 teaches updating the restoration channel set  $R_i$  by (a) removing the channels already used by path  $P_{ii}$ , (b) removing all the channels of path  $l$  and (c) adding all working channels of path  $j$  except the one in link  $14_i$ .

Applicant submits that this is not equivalent to restricting the search for a protection route for a logical link to the set of logical links that use the same color (i.e. wavelength) as that of the link to be protected. Restricting the search in this fashion guarantees that the protection route will not pass through the failed link, since the same color (i.e. wavelength) is not used twice in any one fiber.

It is submitted that the RPCS algorithm of Chaudhuri is entirely different from the color based scheme of the present invention. In fact, Chaudhuri does not even mention the word 'color'

anywhere in the specification. Further, the word 'wavelength' is mentioned only once in connection with the term Wavelength Division Multiplexing (WDM).

Applicant respectfully submits that Chaudhuri fails to teach or suggest all the claims limitations. Specifically, Chaudhuri fails to teach or suggest generating a single color logical topology by removing from consideration (1) all logical links having a color other than that of the link to be protected and (2) the link to be protected and then generating a restoration path for the link to be protected using only the single color logical topology.

It is believed that claims 1-5, 7-8, 10-18, 20-21, 23-26, 40-43 overcome the Examiner's § 102(e) rejection based on the Chaudhuri reference. The Examiner is respectfully requested to withdraw the rejection based on § 102(e).

#### **Response to 35 U.S.C. § 103(a) Rejections**

The Examiner rejected claims 9 and 22 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,324,162 ("Chaudhuri) in view of U.S. Publication No. 2002/0089712A1 ("Kang et al."). Applicant respectfully submits that the prior art fails to disclose or suggest at least a method of determining a protection route comprising the steps of removing (1) all logical links from consideration that have a color other than that of the link to be protected and (2) the link to be protected and generating a restoration path only from the remaining single color logical topology. Therefore, Applicant respectfully traverses the rejections and request favorable reconsideration.

It is submitted that the protection scheme of the present invention is operative to guarantee that the protection route calculation process will not generate a route over a failed link when calculating a protection route for the failed link. In other words, the link a failure occurs on cannot be used to protect itself. Considering an entire set of links that may fail together, such as multiple wavelengths within an optical fiber, the method of the present invention insures that the protection routes for a particular link do not pass through that same link. The method of the present invention guarantees that the same resource is not used to protect two or more logical links that fail together.

The method achieves this by analyzing the color of the logical links making up a network. First, a single color logical topology is generated by removing from consideration (1) all logical links having a color other than that of the link to be protected and (2) the link to be protected. Then, a restoration path for the link to be protected is generated using only the single color logical topology. This guarantees that the protection routes for a link will not pass through that link in the event of a failure. This feature is neither taught nor suggested by the Kang et al. and Chaudhuri references.

Applicant respectfully submits that the combination suggested by the Examiner fails to teach or suggest all the claims limitations. The Examiner has failed to show that one of ordinary skill in the art would have been motivated to modify Kang et al. in view of Chaudhuri to arrive at the claimed invention because neither Kang et al. nor Chaudhuri teaches or suggests the present invention. Specifically, Kang et al. and Chaudhuri fail to teach or suggest generating a single color logical topology by removing from consideration (1) all logical links having a color other than that of the link to be protected and (2) the link to be protected and then generating a restoration path for the link to be protected using only the single color logical topology.

It is believed that claims 9 and 22 overcome the Examiner's § 103(a) rejection based on the Chaudhuri and Kang et al. and references. The Examiner is respectfully requested to withdraw the rejection based on § 103(a).

#### Conclusion

In view of the above amendments and remarks, it is respectfully submitted that independent claims 1, 14, 27 and 40 and hence dependent claims 2-13, 15-26, 28-39, 41-43 are now in condition for allowance. Prompt notice of allowance is respectfully solicited.

In light of the Amendments and the arguments set forth above, Applicant earnestly believes that they are entitled to a letters patent, and respectfully solicit the Examiner to expedite prosecution of this patent applications to issuance. Should the Examiner have any questions, the Examiner is encouraged to telephone the undersigned.

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Respectfully submitted,

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